ELEKTRA SUPER FLOPPY CONTROLLER INSTALLATION MANUAL

CONGRATULATIONS!

You have just purchased the best PIO disk controller available for the SS-50 bus. The ELEKTRA Super Floppy Controller is the only PIO type controller available that will run a maximum of eight (4 5" and 4 8") floppy drives and also support double sided and double density recording on all drives.

Control Port:

The standard control port address used in 6809 systems is $E004 ($8004 for 6800 systems). When set up for 16 addresses per I/O slot, the control port is located as port B of slot 0 (SS-50C). The standard printer port (RS-232) is port A ($E000) of slot 0. When set up in the older 4 addresses per I/O slot configuration, the control port is port A ($E004) of slot 1. As before, the standard printer port (RS-232) is port A ($E000) of slot 0.

Super Floppy Installation:

When installing the Super Floppy Controller in a 4 address per I/O slot configuration, the controller is installed in I/O slot 6 and a jumper must be installed on the motherboard to connect pin 1 (select) of I/O slot 5 to pin 30 (UD-3) of I/O slot 5. When installing the Super Floppy Controller in a system set up for 16 addresses per I/O slot, the Super Floppy Controller is installed in I/O slot 1. No extra motherboard jumpers are required for 16 addresses per I/O slot. The jumpers at J14 on the Super Floppy Controller must be set up for the appropriate number of addresses per I/O slot as described in section 3.1.10 of the Super Floppy Controller Technical Manual.

Maximum Performance:

To utilize all of the features supported by the Super Floppy Controller, the ELEKTRA Super Floppy must be run in the ELEKTRA jumper configuration with appropriate software that has had our ELEKTRA drivers appended on. The documentation does illustrate configurations permitting the ELEKTRA Super Floppy Controller to simulate other controllers such as the SWTPC DC-2 and the GIMIX #28. These controllers do not support all the features of the ELEKTRA. Do not configure the ELEKTRA to simulate these other controllers if you wish to utilize the full capability of the ELEKTRA.

Software:

Three ELEKTRA drivers have been created. The first is designed to be appended onto 6800 FLEX(tm) 2.0 by TSC. The second version appends onto 6800 General FLEX by TSC. The third appends onto 6809 FLEX 9.0 (or FLEX 9.1) by TSC, 6809 General FLEX by TSC, and STAR-DOS(tm) by STAR-KITS (Peter Stark). **We do not, nor intend to in the future, support other versions of FLEX which have been licensed for release by other manufacturers.** First of all, it's illegal by the terms of the licensing agreements signed by these other manufacturers for them to sell their version of FLEX to be used on other manufacturers' hardware. Second, it's beyond our control what these manufacturers may do to their versions of FLEX. As an example, one of the other manufacturers purchased the source of FLEX and the right to reassemble the FLEX core whenever it was desired. Many initialization and adaptation routines were added that were specifically designed for that manufacturer's hardware. These initialization and adaptation routines cannot be guaranteed to work properly on our hardware. Also, the core does not occupy the same exact memory area as specified by TSC in their manuals and some of the initialization and adaptation routines even occupy area designated by TSC as being reserved for drivers. Another manufacturer, although not reassembling the FLEX core, overwrites areas of FLEX core (during load in) with their own coding. Should this coding interact with the drivers that they append onto FLEX, there would be no guarantee as to what might happen to our drivers if our drivers were to be appended on. In addition, this manufacturer's software is known for failing to preserve CPU registers, so unless extra special care is taken whenever accessing subroutines within this manufacturer's software, your programs will fail to function properly. It would be foolish for us to attempt to support other manufacturer's software. **We will only guarantee the operation of our drivers in conjunction with FLEX releases from Technical Systems Consultants and the ELEKTRA versions of STAR-DOS.** Also make sure that you restrict yourself to the utilities, such as COPY.CMD, APPEND.CMD, AND DELETE.CMD, that are supplied by TSC and STAR-KITS respectively. We have encountered a modified FLEX, from another manufacturer, where some of the utilities have been modified in such a way as to corrupt the data written on a diskette prepared by a standard FLEX.

Firmware:

We have long recommended the HUMBUG(tm) and MICROBUG(tm) monitors from STAR-KITS. First, they are the best monitors that are commercially available. Second, Peter Stark is dedicated to selling perfect products. Purchasers of his products register with him and when necessary, he has been able to contact these purchasers when updates of his products were necessary. Third, he has been most cooperative. When we have made suggestions or requests that have been reasonably feasible, he has made it a point to incorporate these ideas into his products to all of our benefit. We have done all of our software development with HUMBUG and MICROBUG monitors and thoroughly recommend their use in your systems. The comments made earlier regarding other manufacturers' versions of FLEX apply equally as well to some of the monitors produced by other manufacturers. We are aware that some monitors offered by other manufacturers place their stack in the very memory area that TSC has reserved for drivers. In addition, there are several monitors known to us that do not preserve all the registers, namely the direct page register (6809), when accessing their subroutines. The ELEKTRA software expects that your monitor has an SBUG-E(tm) compatible jump table starting at $F800 based on indirect addressing.

Difficulty In Reading Disks Created on Non-ELEKTRA Hardware/Software Systems

Most of our customers have not had any difficulty reading FLEX disks prepared on non-ELEKTRA hardware/software systems. Most other manufacturers have taken the trouble to develop their hardware and corresponding software consistent with the specifications set out by the manufacturers of the components around which their systems are based. Unfortunately, this is not true for all the manufacturers. For example, all Western Digital specification sheets specify that a gap be placed between the index hole and the first sector when formatting a new disk. Apparently, this gap can be omitted (or shorter than recommended) without any ill effects in most cases. Should you run into the situation where you are having difficulty reading a disk and you have ascertained that the drives used are in alignment, you may be encountering the above mentioned non-standard recording format.

A second variable is the side select algorithm. Manufacturers have not standardized the information that they record on the diskette to indicate side selection. As a result, double sided diskettes may not be interchangeable between different manufacturers' systems. We chose the 2793 version of the Western Digital chip because the side compare can be disabled **permitting ELEKTRA systems to read other manufacturers' double sided diskettes; however, ELEKTRA double sided diskettes may not be readable by the other manufacturers' systems.**

If you suspect that you are encountering a format gap or side select problem, you might try formatting disks on an ELEKTRA Super Floppy Controller based system to ensure that the recommended gap is placed between the index mark and the first sector. Make sure that you format these disks for single sided recording so that you will avoid the potential side select incompatibility. Also keep in mind that you should match the number of sectors per track to the number used by the other manufacturer. Then record the desired material onto these disks on the other manufacturer's hardware with that manufacturer's software. When finished, you should now have a disk that's readable on an ELEKTRA based system.

Clock Speed:

Our Super Floppy Controller uses the Western Digital 2793 controller chip which functions beautifully at 2 MHz. 2 MHZ operation is essential for double density operation of 8" floppies. 5" single and double density as well as 8" single density is supported at 1 MHz.

Component Updating:

Many of our customers have updated rather old systems, some dating as far back as 1976. It is possible that the IC's dating back to these early times may not successfully function properly at clock speeds required today. For instance, early SS-50 computers ran just slightly faster than 0.9 MHz. In addition, consideration must be given to the SS-50/SS-30 architecture. CPU boards send and receive data and addresses through drivers and buffers. Before these signals can reach cards in the I/O section, address decoding and buffering must be made on the motherboard. Then, more data buffering must be made on the boards populating the 30 pin slots. Timing is critical and some systems may not function as needed at higher speeds. In addition, several manufacturers of floppy controllers, in the past, did not adhere to Western Digital timing specifications when designing their floppy controllers even though their products performed adequately. **Our ELEKTRA Super Floppy Controller is designed to conform to the Western Digital hold time specifications.** Support hardware, then also, should be designed to support these specifications. Operation of our Super Floppy Controller may require component updating for proper operation. Should you experience motherboard problems, we recommend the use of the ELEKTRA motherboard (as well as the ELEKTRA CPU card). At this time, it appears that most motherboard manufacturers that have advertised in the 68 Micro Journal have produced motherboards that successfully support the ELEKTRA Super Floppy Controller dating all the way back to the 1976 SWTPC MP-B. We have had problems with several 1/8" thick motherboards. We have ascertained that **these motherboards have been properly designed** and that **improper operation has been traced to faulty assembly.** Many of the pins of the components installed on these boards are not long enough to reach all the way through the holes from the component side to the solder side of the motherboard. Once these solder joints have been thoroughly heated to ensure good solder bonding between the component pins and the sides of the plated through holes, these boards performed perfectly.

Many customers are using SWTPC MP-09 CPU cards. **All kits and most earlier factory assembled MP-09 CPU boards must be updated per SWTPC application notices which can be obtained directly from Southwest Technical Products Corp.**

We suggest that your CPU card be brought up to 2MHz UniFLEX(tm) specifications. If 2716 EPROMs are to be used on **any** SWTPC MP-09 CPU card, modification must be made to the EPROM circuitry as described in the HUMBUG and MICROBUG manuals from STAR-KITS.

A few problems have been traced to the floppy drives used by our customers. **Old drives and/or bargain basement drives must be suspect.** Before shipping, each factory assembled ELEKTRA Super Floppy Controller is used in our accounting system which consists of a mixture of both 5" and 8" drives for a minimum of two hours to ensure that we are shipping perfectly running Super Floppy Controllers to our customers.

Slow device circuitry:

Most earlier motherboards do not have slow device circuitry which essentially slows down the CPU whenever the I/O slots are selected. The ELEKTRA motherboard has this slow device circuitry; however, its use with our Super Floppy Controller should not be necessary.

Voltage:

The Super Floppy Controller is a single voltage device. Well filtered 8 volt unregulated DC should be available on the bus for regulation down to 5 vdc via the Super Floppy's on board 7805 regulator.

Booting the Super Floppy Controller:

Most available non-ELEKTRA boot strap loaders that are found in SBUG compatible monitors will boot 5" floppies on our Super Floppy Controller. Some will not. None of the non-ELEKTRA boot strap loaders will boot up 8" floppies on our controller. If difficulty arises in booting up 5" or if you desire to boot up on 8" like we do, you must use the ELEKTRA boot loader. **BOOTX.BIN,** which is written in relocatable code, is included on our driver disk. Should reassembly be desired, the source, **BOOTX.VXX,** has also been supplied. We normally install the BOOT in a 2716 Eprom at either $F000 or $E800. To boot up 8", the jumper at J16 will have to be moved from pins 1 and 2 to pins 2 and 3. Current HUMBUGs and MICROBUGs now contain our boot loaders. We cannot guarantee the performance of other boot strap loaders with our Super Floppy Controller. **At this time we are aware of the fact that the SWTPC 6800 SWTBUG(tm) monitor will not boot our floppy controller as well as the GIMIX 6809 autoboot.** Inadequate timing loops are the culprit.

Super FLEX Format:

The Super FLEX Format referred to in the SETUP and FORMAT commands refers to what some people regard as quad density 5 1/4" drives. These drives usually have double the normal capacity that you'll find on the standard 5 1/4" drive and data is transferred through a 50 conductor ribbon cable at the rate normally used by 8" drives. Double density operation of these drives definitely requires 2 MHz clock speed. **Most of you out there have normal 5 1/4" floppies and will most likely use normal FLEX format, not super FLEX format.**

ELEKTRA Driver Diskette:

In order to boot up an operating system that has our drivers appended, the software must be placed on a disk that has been formatted with the ELEKTRA format command. Until you've gotten your system up and running with our super floppy controller and our drivers, **the only disk meeting this requirement is**

the ELEKTRA diskette that was shipped to you with our drivers. The reason for this is that the ELEKTRA loader must be on track zero. A diskette that was created by the TSC NEWDISK command or by some other manufacturer's NEWDISK or FORMAT command will not have placed the correct loader on track zero. The TSC loader will load FLEX 2 or FLEX 9 and transfer control to FLEX without ever loading our drivers which have been appended on to the end of the FLEX.COR, FLEX.SYS, or STAR-DOS. **Our drivers must be loaded in order for our super floppy controller to function properly.** Our drivers include parameter tables describing each of the drives installed. The ELEKTRA FORMAT and SETUP commands (as well as the ELEKTRA drivers) access these drive tables in order to function properly. **A FLEX or STAR-DOS with ELEKTRA drivers must be operational before the ELEKTRA FORMAT and SETUP commands will function.**

The software that we've been shipping out has been tested for many months and to the best of our knowledge is error free. The purpose for requesting the return of your disk for upgrading is to supply an integrated floppy/Winchester software package, not to correct errors. We also may develop "10 device" support drivers, FORMAT, and SETUP commands, to take advantage of STAR-DOS's ability to support up to 10 devices. With STAR-DOS, a physical to logical device translation will be supported within our drivers that will permit 4 5" floppies, 4 8" floppies, and 2 Winchester drives to be active on line at one time. These will be selectable via unit numbers 0 through 9. FLEX supports a maximum of only 4 active drives at one time so the 10 device drivers will not prove to be of any value to FLEX users.

The enclosed 6809 driver disk (if ordered) contains the following files:

LSTARDOS.SYS
DRVRX.BIN
EXTERMX.BIN
TFRADDRX.BIN
BOOTX.BIN
BOOTX.VXX
FORMATX.CMD
SETUPX.CMD
STARTUPX.TXT

LSTARDOS.SYS is a limited version of STAR-DOS provided through the courtesy of Peter Stark. LSTARDOS.SYS will permit you to boot up your disk system and append our drivers onto your copy of FLEX.

DRVRX.BIN is a driver interface to our ELEKTRA Super Floppy Controller.

EXTERMX.BIN is a CRT control terminal driver. It contains printer spooler routines designed to operate in conjunction with the ELEKTRA CPU 8/9. The printer spooler routines will probably work on other brands of CPU cards if they have a M6840 timer chip installed at $E210. The printer spooler routines should not interfere with the operation of CPU boards that are lacking the M6840. The printer spooler function need not be used and you are free to substitute your own I/O driver.

The **TFRADDRX.BIN** file contains the transfer address to the cold start in FLEX and STAR-DOS.

The **FORMATX** command should be used in place of the TSC NEWDISK command or STAR-DOS FORMAT command.

To configure your system for mixed drives, 80 track drives, double sided, or double density, use the **SETUPX** command. The software displays prospective parameters and asks "are you sure" for verification before installing intended parameter changes. "A" will abort the command.

Instructions for the **SETUPX** and **FORMATX** commands are at the back of the enclosed ELEKTRA Super Floppy Technical Manual.

Append our drivers to your copy of FLEX 9 or STAR-DOS by typing:

```
+++APPEND,FLEX.COR,DRVRX.BIN,EXTERMX.BIN,TFRADDRX.BIN,AAAFLEX9.SYS
+++LINK,AAAFLEX9.SYS

            or

+++APPEND,FLEX.SYS,DRVRX.BIN,EXTERMX.BIN,TFRADDRX.BIN,AAAFLEX9.SYS
+++LINK,AAAFLEX9.SYS

            or

+++APPEND,STAR-DOS.COR,DRVRX.BIN,EXERMX.BIN,TFRADDX.BIN,STAR-DOS.AAA
+++LINK,STAR-DOS.AAA
```

If you are using the FLEX.COR from General FLEX, we suggest using AAAFLEXG.SYS instead of AAAFLEX9.SYS for the name of the new ELEKTRA-FLEX.

The AAAFLEXX.SYS or STAR-DOS.AAA must be placed on a diskette that has the ELEKTRA loader on track zero and then linked. Until you've been able to format new disks with the ELEKTRA FORMATX.CMD, you will have to place the AAAFLEXX.SYS or STAR-DOS.AAA on the ELEKTRA disk that contains our driver package.

Unmodified versions of 6800 MiniFLEX, 6800 FLEX 2, 6809 FLEX 9, and 6809 STAR-DOS can be used on our Super Floppy Controller if the controller is configured to function as a SWTPC DC-2 controller. This is not recommended since you cannot take advantage of double headed drives nor double density. Unmodified versions of MiniFLEX or FLEX also will not run at 2MHz on anyone's hardware due to inadequate timing loops. To configure the Super Floppy Controller to function as a DC-2, move the jumper at J17 from pins 1 and 4 to pins 1 and 2. The pins at the various jumper areas are numbered in a counter clockwise manner starting with pin 1 in the upper left corner in the same manner as IC's are numbered. In addition, check jumpers at J14 to be sure that the board is properly configured for 4, 8, or 16 addresses per I/O slot to conform to your motherboard configuration.

Also enclosed is the jumper configuration that will allow our Super Floppy Controller to emulate the GIMIX #28 controller. The GIMIX #28 version of FLEX will run on our Super Floppy controller board when configured to either the GIMIX #28 jumper configuration or the standard ELEKTRA jumper configuration. Keep in mind that the GIMIX #28 version of FLEX does not support 8" drives.

The **STARTUPX.TXT** file has been included only as an example to use when creating your own STARTUP file.

Problems:

Should you feel that the ELEKTRA super floppy controller is not functioning properly, telephone consultation will be required before any action should be taken. We will try to solve your problems over the phone. Consultation is available most weekdays between the hours of 4 PM and 6 PM central standard time. Should a return of our product(s) be necessary, an RA (return authorization) number must be received by phone first, before shipping any products back to us. If repairs are made within the warrantee period, no repair charges will be levied. You will have to pay the freight to us; we'll pay the freight back. If, upon receipt of your hardware, we find that the hardware performs perfectly, a $20.00 service charge will be assessed unless waived by us at the time of issuing the repair authorization.

Since manufacturers have, as a whole, been inclined to "go their own way" at the expense of customers who have supported the SS-50 bus throughout these many years, we have been called upon for support. We at AAA Chicago Computer Center have endeavored to support our customers. As long as we continue to get your support and cooperation and it is economically feasible, we will continue to add products to our line that can be integrated into your current systems. The on going discussion must have impressed upon you what a formidable task this is. Please be aware of the many limitations that exist. We'll be trying our best.

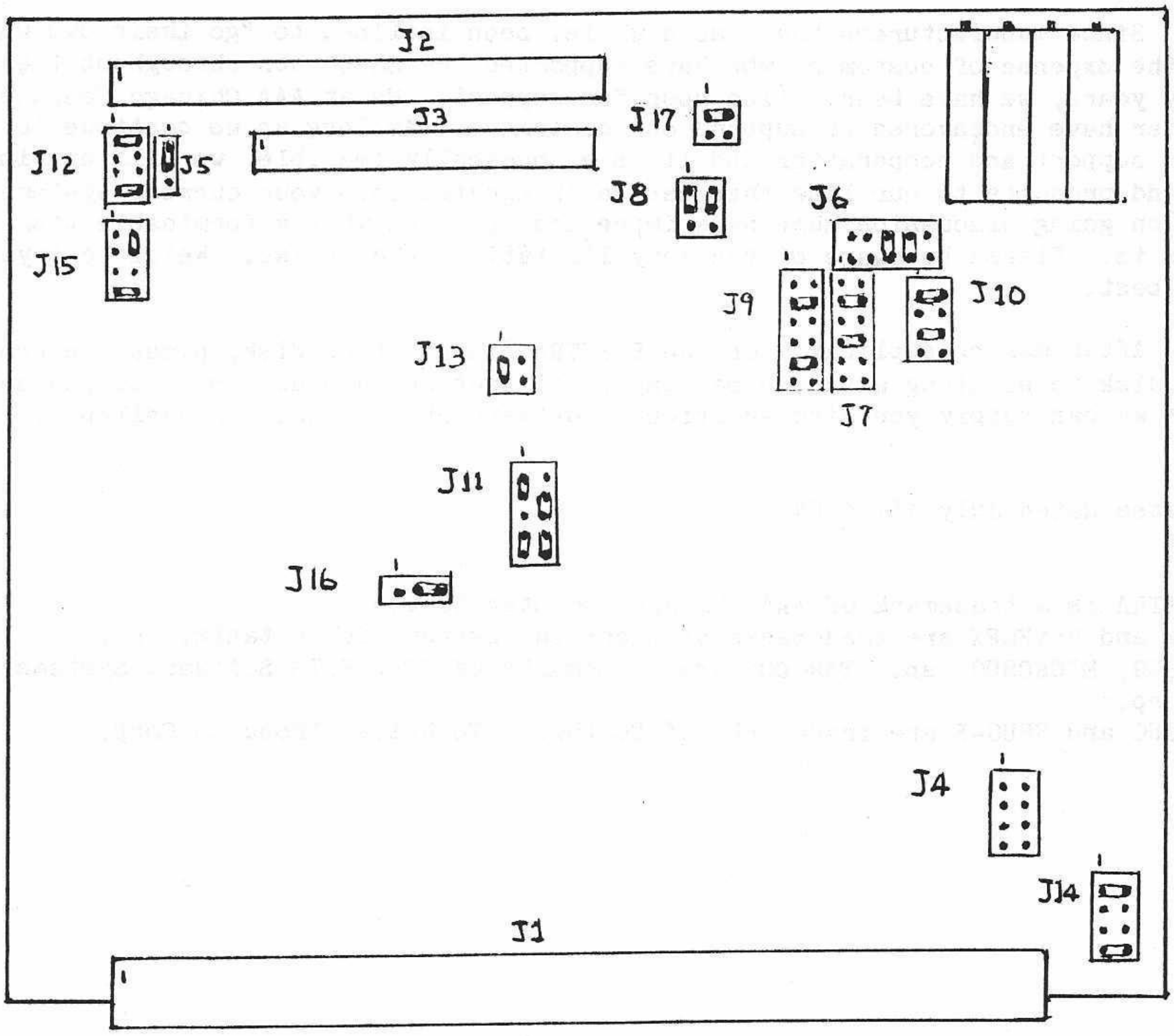
After making duplicates of the ELEKTRA distribution disk, please return the disk to us along with the mailing label that we have addressed to you so that we can supply you with additional software when it becomes available.

Release dated July 18, 1984

ELEKTRA is a trademark of AAA Chicago Computer Center.
FLEX and UniFLEX are trademarks of Technical Systems Consultants, Inc.
HUMBUG, MICROBUG, and STAR-DOS are trademarks of STAR-KITS Software Systems Corp.
SWTBUG and SBUG-E are trademarks of Southwest Technical Products Corp.

STANDARD ELEKTRA JUMPER CONFIGURATION

Options shown for:
(1) Boot up on 8"
(2) 16 addresses per I/O slot



The pins at the various jumper areas are numbered in a counter clockwise manner starting with pin 1 in the upper left corner in the same manner as IC's are numbered.

J14 2-7, 3-6 for 4 addresses per I/O slot
1-8, 3-6 for 8 addresses per I/O slot
1-8, 4-5 for 16 addresses per I/O slot

J16 1-2 for 5" boot
2-3 for 8" boot